

Interactive comment on “Increased aerosols content in the atmosphere over Ukraine during summer 2010” by Evgenia Galytska et al.

Anonymous Referee #4

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Review of Increased aerosols content in the atmosphere over Ukraine during summer 2010, Evgenia Galytska, Vassyl Danylevsky, René Hommel, and John P. Burrows

This study re-visits the fires of summer 2010 over western Russia and surrounding countries. The impact of aerosol burden and composition over Ukraine are evaluated. This study closes the loop on analyses using aerosol data from satellite and in-situ measurements to discuss that effect of the Russian fires on neighboring countries; specifically in this case, Ukraine.

The study is poorly written. There are numerous* issues with the grammar and sentence structure (I've included a few of the most egregious ones) that I strongly suggest having a colleague (fluent in English) vet the sentences for clarity and syntax. In particular what is missing is 'the' for proper nouns. For example in the text authors say 'we

used data mostly from Kyiv site' when it should be written 'we used data from the Kyiv site'. Authors also pluralize words that should be singular.

Furthermore, authors do not stay on one tense. Pick one: past or present. The manuscript requires a re-read on this. Such error is too extensive to document.

Having said that, the method and general results are not faulty. Ignoring the poor English, the study is good enough to be published with major revisions, such as improving the writing and additional analysis to support many of the authors' claims.

Authors write 'summer' 2010 in the introduction – define the months or was it one month, i.e. August, which you quote from previous studies? Be precise: is it summer or merely August?

3rd paragraph in abstract - Remove 'apparently'. High pollution over Moscow that summer 'was' due to the fires. There's nothing apparent about it. - I do not like the term 'combustion center'. Be precise – it was fires. - 'aerosol content' - singular

Last sentence in abstract: 'change of the particle microphysics'

Pg 2, Line 4: but a 'non' negligible

Last sentence of the Introduction first paragraph needs to be re-written. The sentence is long for one.

Pg 2, Line 33: Remove indentation. Join paragraph to previous one or give the Konovalov et al study its own paragraph. Also, you define AERONET here but have already used it in the second paragraph.

Define ETR

Pg 3 line 6: 'aerosol'

Pg 3, line 10: Elaborate on the 'synoptic situation' – I assume this is meteorology driven definition.

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Pg 3, line 34: 'in-detail studies' – poor English.

Pg 4, line 1: 'meteorological situation' – poor English - informal.

The Introduction needs work:

Authors need to do a better job expanding the first paragraph emphasizing the impact of Russian wildfires and making that distinction between fires and wildfires. Authors need to review and answer:

- What made the Russian 2010 fires exceptional? - How did it start? - How did it evolve? - Why is it important to study? (don't just state it and who is this international scientific community?) - Justify why after seven years, another study of the Russian wildfires is necessary?

More in-depth review of the Russian fires is required because at this point I don't know what notable contribution this study makes or why it is important to continue studying this one-time event.

Although it is very worthwhile to review the seminal papers that covered the Russian wildfire the authors do not go about it sequentially. Review each study separately – give them their own paragraph if necessary, tie them together by theme (satellite, model and in-situ or aerosol parameter or other), then introduce your study. Twice authors have introduced their study in different parts of the introduction.

Pg 4, lines 12-14: metrology is a noun, not a verb. That entire sentence needs to be revised.

Pg 4, line 20: missing parenthesis in Holben et al

Pg 4, line 23: you mean inversion algorithm.

Section 2.1 - I would like to have a map of the sites listed in Table 1, in which you use data. Context is required.

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Pg 5, line 2 – This is a repeat sentence. Authors already mentioned using L2 data.

Sentence in Pg 5, lines 10-13 needs to be re-written.

Pg 5, line 15: We ‘use’ – stay on one tense.

Pg 5, lines 17: what are the ‘favorable weather conditions’ ?

The title of section 2.4 is poorly written. It needs to be re-written

Section 2.4 is the first time you mention the time period of your study. This needs to be mentioned in the introduction when you introduce your study.

Again, the English needs to be cleaned up in Section 3.

The following sentences are poorly written: “Significantly higher chance of AERONET site to be into the MODIS field of view and it provides opportunities for both instruments data comparison. In the following, first we directly compare MODIS AOD to sunphotometer AOD, followed by comparing the AOD of CALIOP to MODIS.”

Section 3: In the first paragraph you write ‘We assess the influence of biomass burning during summer 2010 on aerosols over Ukraine and neighboring territories . . .’ then in the last paragraph you again write ‘To identify the impact of fires on air pollution by aerosols over Ukraine, including Kyiv . . .’ . These two sound the same and repetitious.

The title of Section 3.1 is not precise. The Russian fires were a combination of forest, grass, and peat burning, as you previously mention. The title should either remove ‘forest’ or be precise and be ‘forest, grass, and peat fires’.

Again what is ETR?

Again, I want to see a map of the locations of all cities in Table 1.

Section 3.1: You refer to this ‘synoptic process’. What is it? You mention meteorology quite a bit without actually explaining the weather conditions that set-up the ideal conditions for the wildfire to rage across the Eastern Europe. In this section I would like

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authors to actually write about the meteorology instead of referring it in vague terms such as 'synoptic situation' (i.e. look at temperature, winds, pressure, RH or remove meteorology from the section since you don't talk about it).

Section 3.1 Last paragraph: Where do you see this change in synoptic processes on Aug 18-21?? You do not show a front or any changes in weather patterns. Are you quoting another study? These are grand conclusions without any data and results to back it up.

Table 1: What is the actual time period over which you calculate these values?

Pg 9, line 2: The word 'apparently' should be removed. Many studies have already proven the fires caused the high air pollution over Moscow – there's nothing apparent about it. Also replace 'combustion center' with what it actually is – fires. This term is not precise and can denote alternative combustion sources, such as anthropogenic.

Pg 10, Back-trajectories show anti-cyclonic tendencies at most sites, other than Moscow and Toravere. The authors fail to notice the temporal and special extent of the stagnant anticyclone over Eastern Europe in their trajectory analysis.

The analysis in Section 3.1 is missing a large chunk of key information. I don't understand how the authors determine the height of the maximum AOD! Up to now, analysis has not been done to show where the peak in the aerosol profile is located to justify picking those heights. How do the authors determine these heights?

There are many places where it is written 'aerosols' when it should be singular. Double check.

Section 3.2

Pg 10, line 28: what is the 'period of observation'?

Table 2: Now you are using a different AOD (440 nm) whereas before you were using 500 nm. What is the difference between using two different wavelengths? I think that

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needs to be explained. Are you using this wavelength to match with the Milinevsky et al study?

Pg 11: Authors keep changing the description of the fires. Here is written 'active fires of vegetation'. Is it wildfires, forest fires, vegetation fires, combustion center, or fires of vegetation? Stick with one descriptor and be consistent. This is not an exercise in creative writing.

Figure 12: Year is missing. Specific dates are mentioned in the text and it is hard to see on the x-axis. I would like authors to mark these dates referred to in the text.

Pg 12, line 1: Use 'pronounced' rather than 'distinctive over Moscow', which was written incorrectly to begin with. Also, the next sentence needs to be re-written.

Pg 13, sentence in lines 5-6: Are you referring only to June 1-2? Why bother? mid-June and the end of June show, by far, the lowest AE. You also show almost 40 observations for June 1 in Figure 5, so I don't know what authors are alluding to here.

Pg 13, first sentence in line 9: 'unstable weather, sometimes with clouds' – where are you getting this information? The language is also informal. For this paragraph what figures are you referring to that you're generating this analysis?? I shouldn't have to guess.

I would like to see a graph of cloudiness and a precipitation index superimposed on the Figure 4c. The authors make numerous inferences to cloudiness with no supporting data.

Pg 14, line 3: Which figure are you getting the AOD at 500 nm value? What is the significance of switching between AOD's?

In Section 3.2 – specific dates are being analyzed. I would like to (1) know which figures are being referred to and (2) a figure with the AOD (440 and 500) and the specific dates referred to in this section. Alternatively, a table will also work. This section is not easy to follow, particularly since the bulk of the analysis is located in the supplementary.

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Summarizing all this as a table should help.

Pg 14, sentence line 18-19: 'As seen from Fig 1a ...' this sentence is imprecise and informal.

Pg 14, line 33: '...different types of fires ...'. How do you know that?

Figure 6: you have the legend reversed: fine mode is the top curve/course mode is the bottom curve. What are the '3 periods' ? Are they written in (b) and (c). I shouldn't have to guess.

Section 3.3

I would like to see a time series of AOD 500 and the periods of the pre-, active-, and post- fires that authors define.

How are these three fire periods different from Witte et al? Is there a time lag? How well-correlated is the onset, duration, and die-down of the fires over Russia compared to over Kyiv?

Table 4: In the text you have resolutions of 10x10, 30x30, 50x50, however in the Table you have 10x10, 20x20, 30x30.

I assume AODSph means the sub photometer – that should be clearly stated in the table and text.

Table 7. Replace 'Time span X' in the first column with the actual time period.

Section 3.3.2

Pg 24, line 3-4: AOD > 0.5 are spotty – are they near urban areas? Is this due entirely to fires or a mix with urban signatures?

Pg 24, second paragraph: The June 1-July 18 CALIOP analysis – where are these data? I would like to see a similar Figure 8 but with this new period. Also, in this paragraph you say AOD is ~1 however, in the previous paragraph for the same time

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period you say $AOD > 0.5$. There are two competing thoughts here.

Pg 25, line 8: 'particle concentration' – this is not the only place where authors erroneously use the plural.

Pg 25, line 21: Where is the Lugansk region in figure 8?

Pg 26, line 15: It is an exaggeration to allude to territories when authors really only did an in-depth analysis over Ukraine.

Pg 26, sentence line 30-31: '... CALIOP measurements was rather challenging task due to fragmentation of data and their high variability.' Fragmentation of data implies it's faulty – what exactly do you mean? Also, why would highly variable data be challenging. I think you mean simply is there isn't enough data comparable to AEROSOL and MODIS.

In the discussion I would like to see a bullet form, or a concise summary list of the conclusions. I still don't know what they are or the value your study brings to this field. What are the key points of this study?

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